

**Amendments to the Drawings:**

The attached drawing sheet includes changes to Figure 7. This sheet, which includes Figs. 7 and 8, replaces the original sheet that also includes Figs. 7 and 8.

Figure 7 has been amended at the block 501 following the "NO" path of block 500 such that the block number "501" has been changed to --502-- to match the specification text at page 16, line 5. Also, the original text in that same block,  
"Destination position=LENGTH/2+POS/2"  
has been replaced by  
--Destination position=LENGTH/2+(POS-1)/2--

Attachments: Replacement Sheet

## REMARKS

Claims 1-10, 12-20, and 22-25 are now pending in the application. Claims 11 and 21 have been canceled without prejudice or disclaimer. The specification, figures and claims 1-2, 7-10, 12-13, 16-20, and 25 have been amended without introduction of new matter. Favorable reconsideration is respectfully requested in view of the above amendments and the following remarks.

A number of amendments have been made merely to address potential informalities in the claims. For example, the device claims have been variously amended to eliminate inconsistent usage between the terms "buffer" and "memory". As amended, these claims now refer to "buffer" exclusively.

Also, claim 25 has been rewritten in independent form (incorporating amendments made to claim 1 -- see further discussion below) to eliminate any possibility of improper dependency.

Figure 7 has also been amended without introduction of new matter to correct several typographical errors. One of these corrections changes the block following the "NO" path out of block 500 so that its reference number is changed from "501" to --502-- to match the specification text at page 16, line 5. Another change to this block changes the text "Destination position=LENGTH/2+POS/2" ,  
to read

--Destination position=LENGTH/2+(POS-1)/2-- . This change is discussed further below.

Claims 11 and 21 stand rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. This rejection is respectfully traversed.

Each of claims 11 and 21 has been canceled without prejudice or disclaimer, so the rejection of these claims has been rendered moot. However, the subject matter defined by claim 11 has essentially been incorporated into base claim 1; similarly, the subject matter defined by claim 21 has essentially been incorporated into base claim 12. Therefore, the issue presented is still relevant and is addressed in the following.

As explained in the Office Action, the basis for the Office's rejection is that the claims describe the destination position being the total number of memory locations divided by 2 and added to the index of the first position divided by 2 if the index of the first position is odd. Since the total number of memory locations is an even number the result of total/2 will be an integer but since the index of the first position is odd in this case the result of index/2 is not going to be an integer so the final result will also not be an integer.

In response, the specification, figure 7, and claims have been amended to now define that if the index of the original position of the incorrectly positioned data item is odd, then the destination position is  $\text{length}/2+(\text{position}-1)/2$ . That the original specification and claims had a typographical error would have been readily ascertained by one of ordinary skill in the art, just as the Office caught this readily apparent error. Support for the correction can be found at least in each of original figures 3 and 5, which show original and final destinations of data items to be moved -- those of ordinary skill in the art would readily have understood how to express this correctly in mathematical terms, using the original figures and their supporting text with or without the mathematical expressions presented in the specification as a starting point.

For at least the foregoing reasons, the subject matter defined by original claims 11 and 21 (which subject matter is now found in independent claims 1, 12, and 25) is believed to be supported by an enabling description. It is therefore requested that the rejection of claims 11 and 21 under 35 U.S.C. §112, first paragraph, be withdrawn.

Claims 11 and 21 stand rejected under 35 U.S.C. §112, first paragraph as allegedly failing to comply with the written description requirement. This rejection is respectfully traversed.

Each of claims 11 and 21 has been canceled without prejudice or disclaimer, so the rejection of these claims has been rendered moot. However, the subject matter defined by claim 11 has been essentially incorporated into base claim 1; similarly, the subject matter defined by claim 21 has been essentially incorporated into base claim 12. Therefore, the issue presented is still relevant and is addressed in the following.

The Office bases this rejection on the allegation that the claims contain subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Again, the Office refers to the fact that the claims describe that the destination position is the total number of memory locations divided by 2 and added to the index of the first position divided by 2 if the index of the first position is odd. Since the total number of memory locations is an even number the result of  $\text{total}/2$  will be an integer but since the index of the first position is odd in this case the result of  $\text{index}/2$  is not going to be an integer so the final result will also not be an integer.

Once again, this is the result of the same typographical error referred to above. The amendments to the specification and figure 7 cure the error. Moreover, the fact that the

inventors had possession of the claimed invention at the time the application was filed is clearly shown at least in original figures 3 and 5 and the supporting text for these figures, which show and describe original and final destinations of data items to be moved -- those of ordinary skill in the art would readily have understood how to express this correctly in mathematical terms, using the figures and their supporting text with or without the mathematical expressions presented in the specification as a starting point.

For at least the foregoing reasons, the specification as now amended is believed to satisfy the requirements of 35 U.S.C. §112, first paragraph. Therefore, it is respectfully requested that this ground of rejection be withdrawn.

Claims 11 and 21 stand rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. This rejection is respectfully traversed.

Each of claims 11 and 21 has been canceled without prejudice or disclaimer, so the rejection of these claims has been rendered moot. However, the subject matter defined by claim 11 has been essentially incorporated into base claim 1; similarly, the subject matter defined by claim 21 has been essentially incorporated into base claim 12. Therefore, the issue presented is still relevant and is addressed in the following.

As explained in the Office Action, the basis for the Office's rejection is that the claims describe the destination position being the total number of memory locations divided by 2 and added to the index of the first position divided by 2 if the index of the first position is odd. Since the total number of memory locations is an even number the result of total/2 will be an integer but since the index of the first position is odd in this case the result of index/2 is not going to be an integer so the final result will also not be an integer.

As has been explained above, the typographical error found in the original claims has been corrected to now define that if the index of the original position of the incorrectly positioned data item is odd, then the destination position is  $\text{length}/2+(\text{position}-1)/2$ . As explained above, that the original specification and claims had a typographical error would have been readily ascertained by one of ordinary skill in the art, just as the Office caught this readily apparent error. Support for the correction can be found at least in each of original figures 3 and 5 and their supporting text, which show and describe original and final destinations of data items to be moved -- those of ordinary skill in the art would readily have understood how to express this correctly in mathematical terms, using the figures and supporting text with or without the mathematical expressions presented in the specification as a starting point.

For at least the foregoing reasons, the subject matter defined by original claims 11 and 21 (which subject matter is now found in independent claims 1, 12, and 25) is believed to be supported by an enabling description. It is therefore requested that the rejection of claims 11 and 21 under 35 U.S.C. §112, second paragraph, be withdrawn.

Claims 7, 8, 18, and 19 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. This rejection is respectfully traversed.

As to claims 7, 8, and 18, the Office bases its rejection on lack of antecedent basis for the limitation "the two first data items." In response, each of the independent base claims 1 and 12 has been defined to define "a pair of data items" that are withdrawn. That there will be a first pair withdrawn is inherent. Claims 7, 8, and 18 have therefore also been amended to now refer to "the first pair of data items", thereby curing the lack of antecedent basis issue.

As to claim 19, it was rejected based on lack of antecedent basis for the limitation "said at least one incorrectly stored data item." Previously, the term "at least one incorrectly positioned data item" was used. In response, claim 19 has been amended to now define "incorrectly positioned data items" consistently throughout the claim, thereby curing the lack of antecedent basis problem.

For at least the foregoing reasons, claims 7, 8, 18, and 19 are believed to define the claimed subject matter with sufficient distinctness and particularity to satisfy the requirements of the statute. It is therefore respectfully requested that the rejection of claims 7, 8, 18, and 19 under 35 U.S.C. §112, second paragraph be withdrawn.

Claims 1-6, 9, and 10 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by "In-Place Reordering of Data using a Double Buffer" IBM Technical Disclosure Bulletin" (hereinafter referred to as "IBM TDB"). This rejection is respectfully traversed.

As now amended, claim 1 defines

Claim 1 (currently amended): A deinterleaving method for sorting a sequence of  $N$  data items from a first order to a second order, wherein  $N$  is an even number, the sequence comprises data items relating to two different sets of data items, and the first order is an interleaving of the two different sets of data items such that the data items from the two different sets of data items are arranged in a list or array alternating one sample relating to each of the two different sets of data items, the method comprising:

withdrawing a pair of data items from said sequence, the pair of data items comprising a first data item and a second data item having respective first and second positions within said sequence;

for each of said withdrawn data items, determining a destination position within said sequence; and

for each of said determined destination positions, determining whether said determined destination position contains any data item, if so replacing the data item of said determined destination position with a respective one of the withdrawn data items, otherwise inserting a respective one of the first data item and the second data item at said determined destination position,

wherein the sequence is indexed from 0 to  $N-1$ , and wherein the destination position of any incorrectly positioned data item is:

the index of an original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is even; or

$N$  divided by 2 and added to the index minus 1 of the original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is odd.

Support for the sequence comprising data items relating to two different sets of data items, and the first order being an interleaving of the two different sets of data items such that the data items from the two different sets of data items are arranged in a list or array alternating one sample relating to each of the two different sets of data items can be found in the original specification at, for example, page 8, lines 21-26 and also in figures 3 and 5.

Support for the method withdrawing and repositioning a pair of data items at a time can be found throughout the specification such as at, for example, page 11, lines 19-22; page 13, lines 3-5; and figures 4 and 6.

Support for the sequence being indexed from 0 to  $N-1$ , and the destination position of any incorrectly positioned data item being: the index of an original position of the incorrectly positioned data item divided by 2, if the index of the first position is even; or  $N$  divided by 2 and added to the index minus 1 of the original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is odd can be found throughout the specification as well as, for example, original figures 3 and

5 and original claim 11. (The correction of the destination position being, for the case in which the index of the original position of the incorrectly positioned data item is odd,  $N$  divided by 2 and added to the index minus 1 of the index of the original position of the incorrectly positioned data item divided by 2, was discussed extensively above.)

Embodiments defined by independent claim 1 are believed to be patentably distinguishable over IBM TDB at least because IBM TDB neither discloses nor even suggests a deinterleaving method for sorting a sequence of  $N$  data items from a first order to a second order, wherein  $N$  is an even number, the sequence comprises data items relating to two different sets of data items, and the first order is an interleaving of the two different sets of data items such that the data items from the two different sets of data items are arranged in a list or array alternating one sample relating to each of the two different sets of data items, the method comprising, *inter alia*:

- withdrawing a pair of data items from said sequence, the pair of data items comprising a first data item and a second data item having respective first and second positions within said sequence;
- for each of said withdrawn data items, determining a destination position within said sequence; and
- for each of said determined destination positions, determining whether said determined destination position contains any data item, if so replacing the data item of said determined destination position with a respective one of the withdrawn data items, otherwise inserting a respective one of the first data item and the second data item at said determined destination position,
- wherein the sequence is indexed from 0 to  $N-1$ , and wherein the destination position of any incorrectly positioned data item is: the index of an original position of the incorrectly positioned data item divided by 2, if the index of the first position is even; or  $N$  divided by 2 and added to the index minus 1 of the original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is odd.

Instead, IBM TDB discloses In-Place Reordering of Data using a Double Buffer, which technique involves withdrawing only a single data item at a time. This can be seen, for

example, in each of IBM TDB Figures 1 and 2, in which Data Item "C" is withdrawn and put into a buffer, leaving a single hole. Data Item "A" is then moved into that hole. IBM TDB discloses two embodiments, one using a one record buffer (figure 1), and another using a two record buffer (figure 2). However, in each case, only a single Data Item is withdrawn and temporarily stored in the buffer at any given step.

IBM TDB also fails to disclose reordering interleaved data comprising data items relating to two different sets of data items. Instead, IBM TDB is related more generally to reordering techniques. Consequently, IBM TDB further fails to disclose or even suggest a technique wherein the destination position of any incorrectly positioned data item is: the index of an original position of the incorrectly positioned data item divided by 2, if the index of the first position is even; or  $N$  divided by 2 and added to the index minus 1 of the original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is odd.

For at least the foregoing reasons, the subject matter defined by independent claim 1, as well as its dependent claims 2-6, 9 and 10, is believed to be patentably distinguishable over that which is disclosed by IBM TDB. It is therefore respectfully requested that the rejection of these claims under 35 U.S.C. §102(b) be withdrawn.

Claims 7 and 8 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over IBM TDB in view of Ohbuchi et al. (US Patent No. 6,971,050 -- hereinafter referred to as "Ohbuchi"). This rejection is respectfully traversed.

Each of claims 7 and 8 depends from independent claim 1, and therefore defines subject matter that is patentably distinguishable over IBM TDB for at least the reasons set forth above. The Ohbuchi document fails to make up for the deficiencies of IBM TDB, so that any combination of IBM TDB with Ohbuchi would still fail to disclose at least the following features:

- withdrawing a pair of data items from said sequence, the pair of data items comprising a first data item and a second data item having respective first and second positions within said sequence;
- for each of said withdrawn data items, determining a destination position within said sequence; and

- for each of said determined destination positions, determining whether said determined destination position contains any data item, if so replacing the data item of said determined destination position with a respective one of the withdrawn data items, otherwise inserting a respective one of the first data item and the second data item at said determined destination position,
- wherein the sequence is indexed from 0 to  $N-1$ , and wherein the destination position of any incorrectly positioned data item is: the index of an original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is even; or  $N$  divided by 2 and added to the index minus 1 of the original position of the incorrectly positioned data item divided by 2, if the index of the original position of the incorrectly positioned data item is odd.

The Office acknowledges that IBM TDB does not disclose interleaved data, but relies on Ohbuchi merely as making up for this deficiency in its Figure 31. However, Applicant has studied Ohbuchi, and cannot find any aspect of Ohbuchi's deinterleaving technique that resembles Applicant's claimed embodiments including the features discussed above.

Ohbuchi therefore fails to make up for the above-enumerated deficiencies of IBM TDB.

For at least the foregoing reasons, the embodiments defined by claims 7 and 8 are believed to be patentably distinguishable over any combination of IBM TDB with Ohbuchi. It is therefore respectfully requested that the rejection of these claims under 35 U.S.C. §103(a) be withdrawn.

Claims 12-16, 19, 20, and 22-25 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over IBM TDB. This rejection is respectfully traversed.

Independent claim 12 has been amended in a manner similar to independent claim 1, and now defines:

Claim 12 (currently amended): A deinterleaving device for sorting a sequence of  $N$  data items from a first order to a second order, wherein  $N$  is an even number, the sequence comprises data items relating to two different sets of data items, and the first order is an interleaving of the two different sets of data items such that the data items from the two different sets of data items are arranged in a list or array alternating one sample relating to each of the two different sets of data items, the deinterleaving device comprising:

a processor for sorting the data items; and  
a buffer for storing the sequence of data items at respective buffer locations within the buffer;

wherein said processor is adapted to withdraw a pair of data items from said sequence from said buffer, the pair of data items comprising a first data item and a second data item having respective first and second buffer locations within said buffer, and said processor is further adapted to determine, for each of said withdrawn data items, a destination buffer location, and, for each of said determined destination buffer locations, to determine whether said determined destination buffer location contains any data item, if so replacing the data item of said determined destination buffer location with a respective one of the withdrawn data items, otherwise inserting a respective one of the first data item and the second data item at said determined destination buffer location,

wherein the buffer locations are indexed from 0 to  $N-1$ , and wherein the destination buffer location of any incorrectly positioned data item is:

the index of an original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is even; or

$N$  divided by 2 and added to the index minus 1 of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is odd.

As mentioned earlier, claim 25 has been rewritten in independent form, and so no longer depends from claim 1. As now amended, claim 25 defines subject matter comparable to that which is now defined by amended method claim 1.

As explained earlier with respect to claim 1, support for the sequence comprising data items relating to two different sets of data items, and the first order being an interleaving of the two different sets of data items such that the data items from the two different sets of data items are arranged in a list or array alternating one sample relating to each of the two different sets of data items can be found in the original specification at, for example, page 8, lines 21-26 and also in figures 3 and 5.

Support for withdrawing and repositioning a pair of data items at a time can be found throughout the specification such as at, for example, page 11, lines 19-22; page 13, lines 3-5; and figures 4 and 6.

Support for the sequence being indexed from 0 to  $N$ -1, and the destination position of any incorrectly positioned data item being: the index of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is even; or  $N$  divided by 2 and added to the index minus 1 of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is odd can be found throughout the specification such as in figures 3 and 5, as well as, for example, original claim 11. (The correction of the destination position being, for the case in which the index of the original buffer location of the incorrectly positioned data item is odd,  $N$  divided by 2 and added to the index minus 1 of the original buffer location of the incorrectly positioned data item divided by 2, was discussed extensively above.)

Embodiments defined by independent claims 12 and 25 are believed to be patentably distinguishable over IBM TDB at least because IBM TDB neither discloses nor even suggests a deinterleaving apparatus for sorting a sequence of  $N$  data items from a first order to a second order, wherein  $N$  is an even number, the sequence comprises data items relating to two different sets of data items, and the first order is an interleaving of the two different sets of data items such that the data items from the two different sets of data items are arranged in a list or array alternating one sample relating to each of the two different sets of data items, the apparatus comprising, *inter alia*:

- a processor or method adapted to withdraw a pair of data items from said sequence, the pair of data items comprising a first data item and a second data item having respective first and second positions within said sequence;
- the processor or method being further adapted to determine, for each of said withdrawn data items, a destination buffer location, and ...
- for each of said determined destination positions, to determine whether said determined destination buffer location contains any data item, if so replacing the data item of said determined destination buffer location with a respective one of the

withdrawn data items, otherwise inserting a respective one of the first data item and the second data item at said determined destination buffer location,

- wherein the buffer locations are indexed from 0 to  $N-1$ , and wherein the destination buffer location of any incorrectly positioned data item is: the index of an original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is even; or  $N$  divided by 2 and added to the index minus 1 of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is odd.

Instead, IBM TDB discloses In-Place Reordering of Data using a Double Buffer, which technique involves withdrawing only a single data item at a time. This can be seen, for example, in each of IBM TDB Figures 1 and 2, in which Data Item “C” is withdrawn and put into a buffer, leaving a single hole. Data Item “A” is then moved into that hole. IBM TDB discloses two embodiments, one using a one record buffer (figure 1), and another using a two record buffer (figure 2). However, in each case, only a single Data Item is withdrawn and temporarily stored in the buffer at any given step.

IBM TDB also fails to disclose reordering interleaved data comprising data items relating to two different sets of data items. Instead, IBM TDB is related more generally to reordering techniques. Consequently, IBM TDB further fails to disclose or even suggest a technique wherein the destination buffer location of any incorrectly positioned data item is: the index of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is even; or the total number of data items divided by 2 and added to the index minus 1 of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is odd.

For at least the foregoing reasons, the subject matter defined by independent claims 12 and 25, as well that defined by claim 12’s dependent claims 13-16, 19, 20, and 22-24, is believed to be patentably distinguishable over that which is disclosed by IBM TDB. It is therefore respectfully requested that the rejection of these claims under 35 U.S.C. §103(a) be withdrawn.

Claims 17 and 18 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over IBM TDB in view of Ohbuchi. This rejection is respectfully traversed.

Each of claims 17 and 18 depends from independent claim 12, and therefore defines subject matter that is patentably distinguishable over IBM TDB for at least the reasons set forth above. The Ohbuchi document fails to make up for the deficiencies of IBM TDB, so that any combination of IBM TDB with Ohbuchi would still fail to disclose at least the following features:

- a processor adapted to withdraw a pair of data items from said sequence, the pair of data items comprising a first data item and a second data item having respective first and second positions within said sequence;
- the processor being further adapted to determine, for each of said withdrawn data items, a destination buffer location, and ...
- for each of said determined destination positions, the processor being adapted to determine whether said determined destination buffer location contains any data item, if so replacing the data item of said determined destination buffer location with a respective one of the withdrawn data items, otherwise inserting a respective one of the first data item and the second data item at said determined destination buffer location,
- wherein the buffer locations are indexed from 0 to  $N-1$ , and wherein the destination buffer location of any incorrectly positioned data item is: the index of an original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is even; or  $N$  divided by 2 and added to the index minus 1 of the original buffer location of the incorrectly positioned data item divided by 2, if the index of the original buffer location of the incorrectly positioned data item is odd.

The Office acknowledges that IBM TDB does not disclose interleaved data, but relies on Ohbuchi merely as making up for this deficiency in its Figure 31. However, Applicant has studied Ohbuchi, and cannot find any aspect of Ohbuchi's deinterleaving technique that resembles Applicant's claimed embodiments including the enumerated features discussed above. Ohbuchi therefore fails to make up for the deficiencies of IBM TDB.

For at least the foregoing reasons, the embodiments defined by claims 17 and 18 are believed to be patentably distinguishable over any combination of IBM TDB with Ohbuchi.

It is therefore respectfully requested that the rejection of these claims under 35 U.S.C. §103(a) be withdrawn.

The application is believed to be in immediate condition for allowance. Prompt notice of same is respectfully requested.

Respectfully submitted,  
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